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## DECREASING THE NEGATIVE EFFECTS OF WORK-RELATED STRESS IN UNCHANGED WORKING ENVIRONMENTS\*\*

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*Background:* Chronic work-related stress has a negative impact on both physical and mental health. The present translational study's goal was to investigate the effectiveness of an individual-focused, standardised coping skills training provided outside the employment setting.

*Methods:* 89 working individuals (76 women, 13 men; mean age: 41.3 years) from diverse occupational backgrounds completed a 12-hour stress management program. Work stress and overcommitment were measured by the Effort-Reward Imbalance Questionnaire (ERI). Outcome variables included perceived stress (PSS10), anxiety- (STAI-T), depressive- (BDI), and subjective somatic symptoms (PHQ15), as well as well-being (WHO-WB5), life meaning (BSCI-LM), coping skills (LSS), and overall life satisfaction.

*Results:* The post-intervention scores showed no change in work-related stress or overcommitment, whilst coping skills improved. Further, anxiety-, depression- and somatic symptoms decreased significantly and there was a significant increase in well-being, life meaning, and life satisfaction scores. These improvements were observed mostly in the subgroup reporting higher initial levels of work stress, associated with higher symptom scores. In the low-stress subgroup, only coping skills, perceived stress, and life meaning scores improved.

*Conclusions:* A short, well-structured multimodal coping skills training can significantly reduce overall stress level and stress-related symptoms, and improve well-being and satisfaction in employees suffering from high work stress even if the work environment remains unchanged.

**Keywords:** work stress, effort-reward imbalance, intervention, depression, anxiety, somatic symptoms, well-being

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*Competing interest:* Adrienne Stauder is the program director of the Williams Lifeskills program in Hungary. She regularly leads paid Williams Lifeskills trainings for various target groups. She also provides training and supervision for training facilitators. Zoltán Cserhádi and Barna Konkoly Thege declare that they have no competing interests.

## 1. Introduction

There is a strong body of evidence suggesting that chronic, intense work-related stress has a negative impact on physical and mental health. The most frequent negative outcomes associated with work stress are an increased risk of depression (KOPP et al. 1995; TENNANT 2001; PIKHART et al. 2004; BONDE 2008; SIEGRIST 2008), cardiovascular morbidity and mortality (KOPP et al. 2006; KIVIMÄKI et al. 2012), higher prevalence of neck, shoulder, or lower back pain (HOOGENDOORN et al. 2000; BONGERS et al. 2006; ANEMA et al. 2007), and overall higher absenteeism from work (HEAD et al. 2007; DARR & JOHNS 2008).

The public health impact of workplace stress has been recognised widely in recent decades, and as a result, an international framework agreement has been published emphasising the employer's responsibility. In accordance with this notion, legal regulations have also been formulated to protect employees (LEVI 2000; European Social Partners 2008). Although policies contain a wide range of practical recommendations, there is still a substantial gap between policy and practice (LEKA et al. 2010). The implementation of workplace health promotion and stress-reduction programs is limited, and the outcomes of the implemented interventions in occupational settings are controversial (VAN DER KLINK et al. 2001; RICHARDSON & ROTHSTEIN 2008; MONTANO et al. 2014). The overall conclusion of this literature suggests that organisational interventions have only a small effect size and more comprehensive interventions are more effective. However, individually-focused interventions have a greater impact on work stress-related symptoms according to a meta-analysis (RICHARDSON & ROTHSTEIN 2008). The cognitive-behavioral interventions were revealed to be the most effective in reaching a large effect size, interventions focusing on relaxation techniques had medium effect size, while the interventions labeled as multimodal showed small effect sizes. Moreover, benefits from multimodal interventions seem to depend on their content and structure.

The superiority of the individually-focused interventions might be explained by the fact that the overall effects of work-related stress on the individual depend on the interaction of stressful working environment and individual coping abilities. The extrinsic components of work-related stress – such as physical and mental demands, low control at work, justice and fairness, job insecurity, and other circumstances – are mainly determined by the organisational structure and culture. Their modification through organisation-level structural changes or increased employee participation is generally a complex and time-consuming process (BOND & BUNCE 2001; SAUTER & MURPHY 2004; TSUTSUMI & KAWAKAMI 2004). Process evaluation studies reveal that a large number of factors influence the success of such interventions, such as the characteristics of the specific organisation, the preparation of the intervention, implementation process, and the individual employee's attitudes and reactions (BIRON & KARANIKA-MURRAY 2014). While the advantage of organisational-level interventions is that all employees may benefit, the complexity of these interventions and the need for personal and financial commitment at the organisational level

makes them difficult to deliver with fidelity. The advantage of the interventions focusing on the improvement of individual stress management skills therefore is that they depend less on organisational and management factors, and thus may be more easily implemented without changing the organisational environment.

Most of the studies investigating the effect and predictors of work stress are based on the job-demand control (JDC) model of Karasek (KARASEK & THEORELL 1992) and the effort-reward imbalance (ERI) model of Siegrist (1996). According to the JDC model, a job with high demands and low control poses a risk for increased workplace stress and stress-related psychosocial complaints. The focus of the ERI model is on the failed reciprocity of the (high) efforts and the rewards in terms of money, promotion prospects, job security, and appreciation from significant others. This effort-reward imbalance elicits sustained stress reactions and negative emotions, which increases stress-related illness susceptibility. These reactions might be reinforced by the presence of an inappropriate coping pattern characterised mainly by overcommitment to work-related demands (VAN VEGCHEL et al. 2005; SIEGRIST 2009). However, studies on individually focused interventions rarely account for those organisational factors that may influence the intervention's effectiveness.

Despite the robust evidence regarding the usefulness of stress management interventions in research trials, the implementation of the same interventions in real-world settings and the sustainability of a program after the termination of a research project is a challenge even in Western countries (OLDENBURG & ABSETZ 2011). Even if a rigorous randomised controlled trial shows an intervention to be effective in a well-defined setting with a carefully selected sample, it is uncertain whether similar benefits can be achieved among not-so-strictly-selected participants in a country with a different (work) culture and societal establishments (CONCATO et al. 2000; WOOLF 2008).

Practically no scientific information exists from Central and Eastern European countries regarding the effectiveness of stress management interventions targeting work-related stress, although this particular kind of stress is considered an explanatory factor of the high premature mortality rates observed in the Central-Eastern European countries (PIKHART et al. 2001; KOPP & RÉTHELYI 2004; KOPP et al. 2008). Life expectancy at birth in Central-Eastern European countries is still below the average of the EU countries (EU-28: 80.6 ys vs. Czech Republic 78.7 ys, Poland 77.5 ys, Slovakia 76.7 ys, and Hungary: 75.7). The Hungarian population not only has a lower life expectancy in comparison to the EU average, but it also has worse indicators than the surrounding Central-Eastern European countries (Hungarian Central Statistical Office 2018). A study comparing Central and Eastern European countries with two Western European counterparts found the highest level of effort-reward imbalance (ERI) in Hungary. In addition, the prevalence of high ERI (above 1) increased from 18.3% in 2006 to 28.6% in 2013 in the Hungarian working population (SALAVECZ 2013). Further, ERI had the strongest effect on negative health outcomes in Hungary, indicating not only the high stress load but that the difficulties to cope with stress can contribute to the negative health consequences. This can be attributed to historical,

economic, and employment-related policies typical for Hungary and CEE countries in general, such as lack of part-time employment opportunities, long working hours, or financial pressure leading to multiple employments simultaneously.

In addition, due to the lower economic productivity of these countries, companies rarely have the resources and commitment to invest in the well-being of their employees, which has prevented the development of employee assistance programs in general and the wide-spread offering of stress management interventions specifically. A further characteristic of the stress management market in Eastern-Europe is that due to the sector's underdeveloped nature, decision makers are often ill-educated regarding the nature and evidence behind the different approaches leading to the intermingling of activities that are primarily recreational in nature (even including health damaging behaviors at employer-supported events) with psychological stress management interventions backed by scientific evidence. This lack of clarity further decreases the perceived importance and credibility of stress management programs both among employers and employees in this particular societal context.

Thus, there is a need for more translational research examining the application and sustainability of such interventions in real-life circumstances in Hungary and other non-Western countries. Our study examined the real-life implementation of a cognitive-behavioral therapy (CBT)-based, standardised, multimodal intervention, the Williams Lifeskills program (WILLIAMS & WILLIAMS 1997), which had been found to be effective in randomised trials (GIDRON et al. 1999; BISHOP et al. 2005; KIRBY et al. 2006; WILLIAMS & WILLIAMS 2011). Specifically, we aimed to identify the impact of this intervention on work-related stress and stress-related symptoms in working people recruited from different occupational settings. Aside from the translational approach to research, this study is innovative in two ways. First, the study utilises psychosocial outcome measures while also incorporating a theoretical model of work-related stress. Specifically, effort-reward imbalance is identified as an indicator of the extrinsic work-related stressors, while overcommitment reflects an intrinsic component of work-related stress. Second, to our knowledge, this is the first report from a Central-Eastern-European country on a stress management intervention trial aiming to reduce work-related stress. Thus, generalisability of Western behavioral medicine expertise was also tested in a culturally different societal context.

## **2. Methods**

### **2.1. Sample and procedure**

Study design, assessment tools, and the consent forms were approved by a regional committee for research ethics (SE TUKÉB 10/2007). The stress management intervention was delivered to employees from various occupational groups outside the work place and independently of the employer. Participant recruitment was conducted via online ads, mailing lists, and flyers. A minimal fee was required for participation to cover the costs of the infrastructure and the workbook. Individuals were

excluded from the study if they had a diagnosis of a severe mental illness or substance dependence. Written consent was collected from all study participants and participation was voluntary. Neither the participants nor the facilitators of the intervention received any incentive for completing / organising the completion of the questionnaires. The participants completed the battery of paper format questionnaires before the start and at the end of the intervention. The self-administered questionnaires were distributed and collected by the intervention facilitators. The time required to complete the assessment battery was approximately 20–25 minutes.

Baseline data were obtained from 119 currently working individuals. Among them, 89 respondents completed the questionnaires after the intervention (74.2% of the sample). Those who dropped out did not differ significantly in their baseline psychological characteristics; however, they reported marginally higher work stress level ( $p = 0.053$ ) and more anxiety symptoms ( $p = 0.054$ ) than those who completed the survey at Time 2. The ‘real life’ recruitment strategy via on-line ads resulted in the fact that the majority of the participants were female white-collar workers, which is a frequently observed phenomenon for most psychosocial intervention where attendance is offered to the general population. *Table 1* displays detailed characteristics of the sample.

## 2.2. The intervention

The Williams LifeSkills Workshop is a multimodal, standardised, cognitive behavioral therapy-based intervention developed in the USA and aimed to improve coping skills (WILLIAMS & WILLIAMS 1997; WILLIAMS & WILLIAMS 2006; WILLIAMS & WILLIAMS 2011). The program consists of sixteen 45-minute (or eight 90-minute) sessions and is standardised through a detailed facilitator manual and a participant workbook. The workshop manual, workbooks, and other connected materials were translated and culturally adapted for use in Hungary (STAUDER et al. 2010). The intervention was delivered in small groups (6–12 participants) over a 4- to 6-week period. The content of the training focuses on identifying problem situations, decision making, decreasing negative thoughts and emotions, problem solving, self-assertion and ability to decline demands, as well as relaxation techniques. In addition, the program puts special emphasis on building social relationships through improving empathy and communication skills. Psychoeducation, cognitive and behavioral techniques, role-playing, and relaxation techniques are used to teach and practice these coping skills. Although the structure and the content of the program are standardised, the workshops are highly individualised as participants are encouraged to practice the techniques on their own and adapt them to their specific stress and problem situations (for example: through the program workbook). The intervention was delivered by professionals who 1) obtained at least a master’s level qualification in medicine, (mental) health care, social sciences or education, and had some previous experience with group leading; and 2) completed a well-structured, manualised, 80-hour training that was developed specifically for Williams Lifeskills facilitators. The training includes the following main elements: participation in the

*Table 1*  
Sociodemographic characteristics of the sample

		Initial sample (N=119)	Dropped out (N=30)	Follow-up sample (N=89)	Comparison of completers and non-completers	
					Test statistics	p
Age (years), [M, SD]		37.1 (12.6)	40.5 (12.9)	37.3 (13.3)	t = 0.99	0.323
Sex [N (%)]	Male	25 (21.0)	12 (40.0)	13 (14.6)	$\chi = 8.72$	0.003
	Female	94 (79.0)	18 (60.0)	76 (85.4)		
Education [N (%)]	Elementary or industrial school	14 (11.8)	4 (13.3)	10 (11.4)	$\chi = 13.24$	0.010
	Technical school	17 (14.3)	10 (33.3)	7 (7.9)		
	High school	20 (16.8)	5 (16.7)	15 (16.7)		
	College / university	66 (55.5)	11 (36.7)	55 (61.8)		
	Missing data	2 (1.7)	0 (0)	2 (2.2)		
Marital status [N (%)]	Single	28 (23.5)	9 (30.0)	19 (21.3)	$\chi = 0.34$	0.490
	Married	47 (39.5)	8 (26.7)	39 (43.8)		
	Divorced	26 (21.8)	9 (30.0)	17 (19.1)		
	Cohabitant	14 (11.8)	4 (13.3)	10 (11.2)		
	Widowed	2 (1.7)	0 (0)	2 (2.2)		
Children [N (%)]	Missing data	2 (1.7)	1 (3.3)	2 (2.2)	$\chi = 2.27$	0.686
	No child	40 (33.6)	13 (43.3)	27 (30.3)		
	1 child	24 (20.3)	4 (13.3)	20 (22.5)		
	2 children	36 (30.3)	10 (33.3)	26 (29.2)		
	3 or 4 children	10 (8.4)	2 (6.7)	8 (9.0)		
Type of settlement [N (%)]	Missing data	9 (7.6)	1 (3.3)	8 (9.0)	$\chi = 1.72$	0.423
	Capital	73 (61.3)	21 (70.0)	52 (58.4)		
	City	35 (29.4)	6 (20.0)	29 (32.6)		
Employment [N (%)]	Village	11 (9.2)	3 (10)	8 (9.0)	$\chi = 7.66$	0.022
	State employee	53 (44.5)	7 (23.3)	46 (51.7)		
	Employee	60 (50.5)	20 (66.7)	40 (44.9)		
Job sector [N (%)]	Contractor	6 (5.0)	3 (10.0)	3 (3.4)	$\chi = 24.88$	0.015
	Education and culture	27 (22.7)	5 (16.7)	22 (24.7)		
	Health care	25 (21.0)	3 (10)	22 (24.7)		
	Services	16 (13.4)	5 (16.7)	11 (12.4)		
	Other civil service	12 (10.1)	8 (26.7)	4 (4.5)		
	Commerce	10 (8.4)	1 (3.3)	9 (10.1)		
	Finances	8 (6.7)	4 (13.3)	4 (4.5)		
	Industry	4 (3.4)	2 (6.7)	2 (2.2)		
Else (not specified)	17 (14.3)	2 (6.7)	15 (16.8)			
Job position [N (%)]	Laborer	12 (10.1)	6 (20.0)	6 (6.7)	$\chi = 10.18$	0.017
	Clerical/administrator	14 (11.8)	7 (23.3)	7 (7.9)		
	Professional	72 (60.5)	13 (43.3)	59 (66.3)		
	Executive/manager	17 (14.3)	4 (13.3)	13 (14.6)		
	Missing data	4 (3.4)	0 (0)	4 (5.5)		

intervention as a regular participant, educational module with a practical exam, and organisation and delivery of the intervention under the supervision of a licensed facilitator.

### 2.3. Measures

Work stress was assessed by the 15-item Hungarian version (SALAVECZ et al. 2006) of the Effort-Reward Imbalance (ERI) Questionnaire (SIEGRIST et al. 2004). Four indicators can be computed from the raw scores: effort, reward, effort-reward imbalance, and overcommitment. The Hungarian version (STAUDER & KONKOLY THEGE 2006) of the 10-item Perceived Stress Scale (PSS-10) (COHEN et al. 1983) was used to measure general stress level during the month preceding the assessment. This questionnaire assesses emotions and cognitions related to situations in one's life in general that are appraised as stressful. Items were designed to tap how unpredictable, uncontrollable, and overloaded respondents found their lives. Anxiety was measured by the trait part of the Hungarian version (SIPOS et al. 1994) of Spielberger's State-Trait Anxiety Inventory (STAI-T) (SPIELBERGER et al. 1970). This 20-item instrument measures symptoms of anxiety in the long-term and is defined by the relatively stable individual differences between people in their tendency to perceive situations as dangerous, and in their disposition to react to such situations more intensely. Severity of depressive symptoms was evaluated by the 9-item shortened (BDI-S) Hungarian version (RÓZSA et al. 2001) of the Beck Depression Inventory (BECK et al. 1961). The scores of this shortened scale were transformed into equivalents of the original 21-item version in this study for international comparability. With the normal range of BDI-scores being zero to nine points, 10–17 points indicate moderate depressive symptoms, and scores above 18 indicate the possibility of clinical depression. To measure subjective somatic health complaints, the Somatic Symptom Severity Scale (PHQ-15) derived from the Patient Health Questionnaire (PHQ), was used (KROENKE et al. 2002). This 15-item scale covers the most prevalent subjective health complaints (e.g. pain, gastrointestinal symptoms) and the respondents are asked to rate their burden from each symptom as "Not bothered / Bothered a little / Bothered a lot."

To assess meaning of life, the 8-item Hungarian version (KONKOLY THEGE et al. 2008) of the Life Meaning Subscale from the Brief Stress and Coping Inventory (RAHE & TOLLES 2002) was used. The 5-item Hungarian version (SUSÁNSZKY et al. 2006) of the WHO Wellbeing Questionnaire (BECH et al. 1996) measured general psychological well-being, while general satisfaction with life was measured by a single question ("Taken as a whole, to what extent are you satisfied with your life at the moment?"). To assess the individuals' coping skills, the 10-item Life Skills Scale<sup>1</sup>

<sup>1</sup> M. Hocking, V. Williams, J. Lane & R. Williams: 'Development of a New LifeSkills Scale to Measure a 'Positive' Psychosocial Risk Factor Profile', Annual meeting of the Society for Behavioral Medicine (Salt Lake City, UT.: March 19–22, 2003).

was used. This instrument was designed specifically to evaluate one's self-rated ability to use the stress management skills included in the intervention (Williams LifeSkills Workshop, see above).

## 2.4. Statistical methods

The SPSS statistical package, version 23.0, was used for data analysis. To examine the relationship between work stress and the other outcome variables, a partial correlation analysis was conducted controlling for age and sex. The participant groups with high versus low work stress were compared using independent sample t-tests. To evaluate the effectiveness of the intervention, paired sample t-tests were used, comparing the baseline and end-of-intervention test scores. To express effect size for the t-tests, Cohen's d-values were calculated using a web-based application ([http://davidmlane.com/hyperstat/effect\\_size.html](http://davidmlane.com/hyperstat/effect_size.html)).

## 3. Results

### 3.1. Associations between work stress and stress-related symptoms

At baseline, there was a significant correlation between work stress (effort-reward imbalance) and perceived stress ( $r = 0.49$ ;  $p < 0.001$ ), anxiety ( $r = 0.47$ ;  $p < 0.001$ ), depressive symptoms ( $r = 0.45$ ;  $p < 0.001$ ), subjective somatic health complaints ( $r = 0.41$ ;  $p < 0.001$ ), well-being ( $r = -0.35$ ;  $p = 0.001$ ), life meaning ( $r = -0.36$ ;  $p = 0.001$ ), overall life satisfaction ( $r = -0.37$ ;  $p < 0.001$ ), coping skills ( $r = -0.36$ ;  $p < 0.001$ ), and overcommitment ( $r = 0.48$ ;  $p < 0.001$ ). Twenty persons, comprising 22.5% of the participants, reported severe work stress defined as an effort/reward index of larger than 1.

### 3.2. Comparison of high and low work stress subgroups

For more nuanced analysis, we divided the sample into high and low work stress subgroups by using the 50th percentile split based on the baseline effort-reward imbalance score (below vs. above ERI index of 0.66). The two subsamples included 46 (7 men, 39 women) and 43 individuals (6 men, 37 women), respectively. The main sociodemographic characteristics of these two subgroups – sex ratio, mean age, marital status, number of children, settlement size, and employment status – did not differ significantly. In the low ERI subgroup, there was a significantly higher proportion of blue-collar workers and people from the financial sector. The high ERI subgroup proved to have significantly higher symptom scores on the measures of perceived stress, anxiety, depressive symptomatology, and subjective somatic complaints. In addition, they scored lower on the coping skills scale, found their lives less meaningful, and their well-being and level of overall satisfaction were lower at baseline (*Table 2*).

*Table 2*  
Comparison of employees experiencing high versus low work stress

	<i>High ERI (N=46)</i>		<i>Low ERI (N=43)</i>		<i>Comparison</i>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>p</i>
<i>Effort</i>	3.18	0.87	1.55	0.61	13.16	< 0.001
<i>Reward</i>	3.08	0.75	3.92	0.69	-6.84	< 0.001
<i>Effort-reward ratio</i>	1.08	0.37	0.40	0.13	13.92	< 0.001
<i>Overcommitment</i>	16.17	3.38	13.07	2.83	5.39	< 0.001
<i>Perceived stress</i>	22.45	5.73	17.72	5.41	4.34	< 0.001
<i>Anxiety symptoms</i>	52.03	11.27	44.05	9.58	4.03	< 0.001
<i>Depressive symptoms</i>	18.63	13.97	9.26	9.12	4.54	< 0.001
<i>Somatic health complaints</i>	8.26	5.49	5.88	4.29	2.46	0.015
<i>Life meaning</i>	10.42	3.85	12.41	2.72	-2.84	0.005
<i>Well-being</i>	6.85	2.64	8.28	2.97	-2.55	0.012
<i>Overall satisfaction</i>	5.67	2.35	6.87	1.84	-2.83	0.005
<i>Coping skills</i>	33.07	4.04	35.79	4.48	-3.84	< 0.001

### 3.3. Effectiveness of the intervention

Concerning work stress indicators, no significant change occurred between pre- and post-treatment scores in the total sample; neither the effort-reward imbalance index, nor the overall overcommitment score, had changed (*Table 3*). However, perceived stress decreased and coping skills improved significantly ( $p < 0.01$ ). All stress-related symptoms (anxiety, depressive symptoms and subjective somatic symptom scores) decreased significantly, and indices of well-being (life meaning, WHO Wellbeing and satisfaction scores) significantly improved ( $p < 0.01$ ).

*Table 3*  
Comparison of pre- and post-intervention scores across study variables (N=89)

	<i>M<sub>pre-intervention</sub> (SD)</i>	<i>M<sub>post-intervention</sub> (SD)</i>	<i>t</i>	<i>p</i>	<i>Cohen's d</i>
<i>Effort-reward imbalance</i>	0.74 (0.30)	0.75 (0.47)	-0.279	0.781	0.03
<i>Overcommitment</i>	2.46 (0.44)	2.38 (0.57)	1.699	0.093	0.18
<i>Perceived stress</i>	20.07 (5.51)	17.34 (5.34)	4.642	< 0.001	0.50
<i>Anxiety symptoms</i>	48.17 (8.10)	44.53 (9.77)	4.242	< 0.001	0.45
<i>Depressive symptoms</i>	14.10 (9.59)	10.70 (11.50)	3.348	0.001	0.36
<i>Somatic health complaints</i>	7.13 (3.12)	6.43 (4.62)	2.078	0.041	0.22
<i>Life meaning</i>	11.38 (2.58)	12.53 (3.04)	-4.220	< 0.001	0.45
<i>Well-being</i>	7.56 (2.84)	8.45 (2.63)	-2.912	0.005	0.31
<i>Overall satisfaction</i>	6.27 (1.40)	6.87 (2.03)	-3.984	< 0.001	0.43
<i>Coping skills</i>	34.43 (4.37)	36.36 (3.68)	-4.093	< 0.001	0.44

We hypothesised that the beneficial changes in psychological outcomes were the result of improvement in coping skills (LSS scores) and changes in the appraisal of stressful situations (PSS10 scores). To investigate which element of the intervention was the more robust carrier of improvement, we analysed the partial correlation between changes in symptom scores and changes regarding the given mediator controlling for the other potential mediator (*Table 4*). Improvement in Perceived Stress scores (controlling for improvement in coping skills) showed significant correlation with improvement in anxiety, depressive symptoms, well-being, life meaning and overall satisfaction; while improvement in coping skills (controlling for change in perceived stress) was significantly associated only with change in anxiety. These findings suggest that the change in the appraisal of stressful situations has the major mediating effect on the improvement of psychological well-being.

*Table 4*  
Symptom scores reduction and benefits of the training are mediated mostly by a change in the appraisal of the situation (perceived stress) and less by coping skills

	$\Delta$ Perceived stress		$\Delta$ Coping skills	
	$r^+$	$p$	$r^{++}$	$p$
$\Delta$ Effort-reward imbalance	0.16	0.167	0.05	0.645
$\Delta$ Overcommitment	0.24	0.030	-0.09	0.415
$\Delta$ Anxiety	0.60	< 0.001	-0.22	0.042
$\Delta$ Depressive symptoms	0.34	0.001	0.06	0.581
$\Delta$ Somatic health complaints	0.20	0.073	< 0.01	1.000
$\Delta$ Well-being	-0.31	0.004	0.08	0.499
$\Delta$ Life meaning	-0.47	< 0.001	0.17	0.138
$\Delta$ Overall satisfaction	-0.46	< 0.001	0.02	0.893

Note: + Partial correlation coefficients controlling for  $\Delta$  Coping skills; ++ partial correlation coefficients controlling for  $\Delta$  Perceived stress

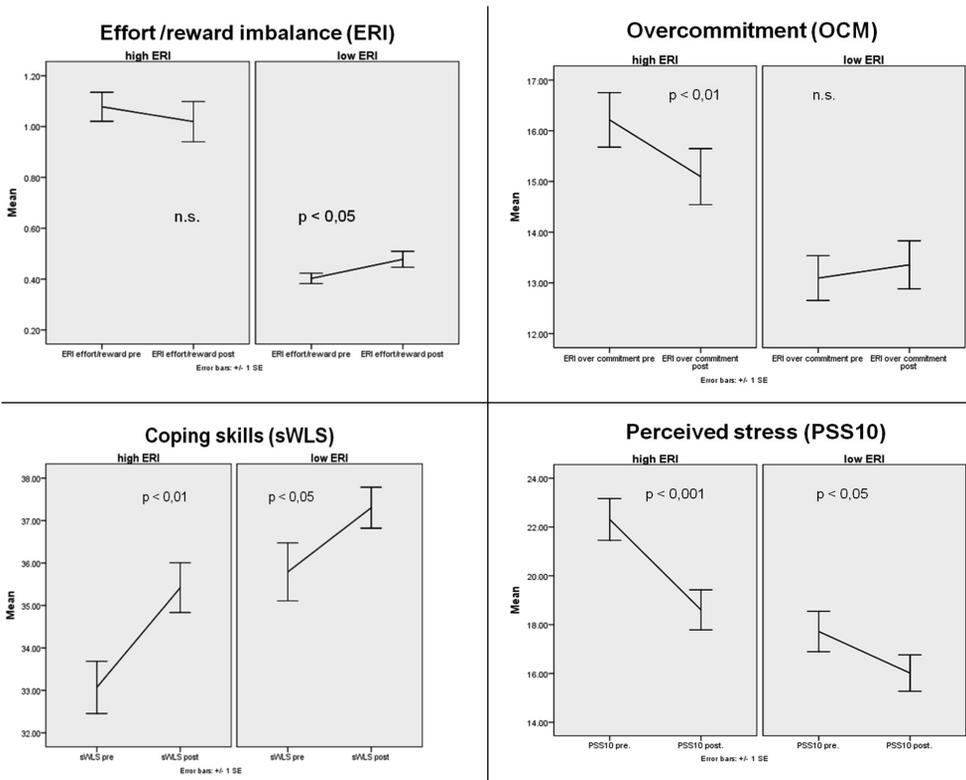
Finally, t-tests were also conducted separately for the high and low work stress groups to evaluate the influence of the extrinsic work-related factors on the intervention outcomes. In the high work stress group, the magnitude of the changes was greater, and the post-intervention symptoms scores not only decreased but even approached the *pre*-training scores of the low ERI group (*Figure 1*), while the ERI scores remained unchanged. In this subgroup, medium effect sizes were observed in perceived stress, anxiety, depressive symptoms, coping skills, well-being, and life meaning (*Table 5*).

In the low ERI group, no significant changes appeared in the symptom scores, which might be related to the fact that they were already low at baseline. However, this subgroup also demonstrated a significant decrease in perceived stress, and an improvement in their coping skills and life meaning scores (*Table 5*). Interestingly, this group had a significant increase in the ERI index due to an increase in the Effort Subscale scores.

*Table 5*  
Effects of the intervention on work stress and symptom scores  
in the high and the low work stress subgroups

	High ERI				Low ERI			
	M Diff	t	p	Effect size	M Diff	t	p	Effect size
Effort-reward imbalance	0.06	1.01	0.317	0.13	-0.08*	-2.34	0.024	0.44
Overcommitment	0.18*	2.66	0.011	0.31	-0.02	-0.26	0.793	0.04
Perceived stress	3.71*	4.09	< 0.001	0.67	1.70*	2.37	0.022	0.33
Anxiety symptoms	5.76*	4.56	< 0.001	0.56	1.38	1.30	0.202	0.14
Depressive symptoms	6.13*	4.21	< 0.001	0.48	0.49	0.38	0.708	0.05
Somatic health complaints	1.10*	2.49	0.017	0.22	0.24	0.48	0.633	0.06
Life meaning	-1.57*	-3.49	0.001	0.44	-0.72*	-2.44	0.019	0.27
Well-being	-1.38*	-3.64	0.001	0.56	-0.38	-0.80	0.429	0.13
Overall satisfaction	-0.84*	-3.97	< 0.001	0.38	-0.34	-1.64	0.109	0.19
Coping skills	-2.35*	-3.34	0.002	0.60	-1.51*	-2.40	0.021	0.39

\* significant change



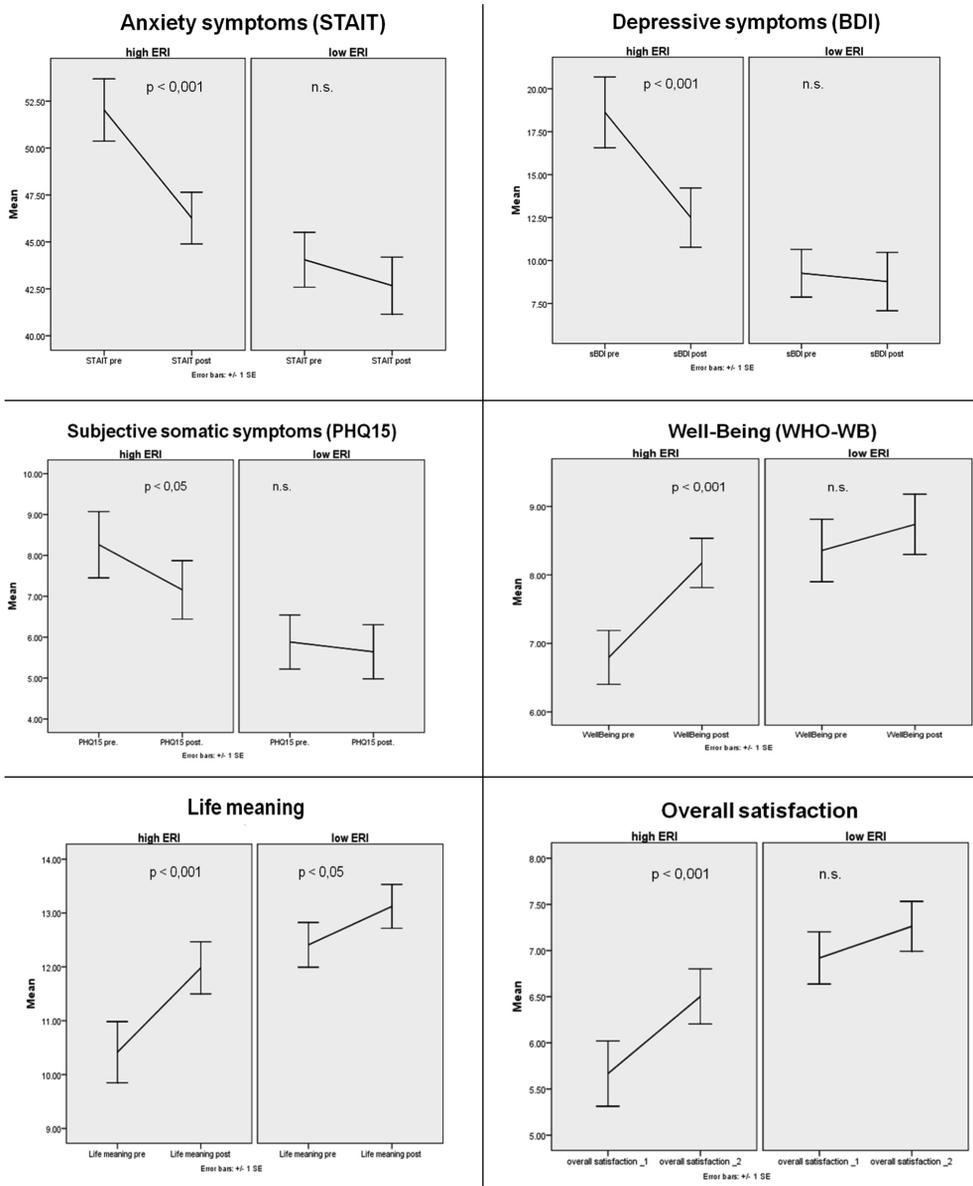


Figure 1

Changes in work stress and symptom scores in the high versus low work stress groups from baseline to post-intervention (means and standard errors)

#### 4. Discussion

In this translational research, the Hungarian version (STAUDER et al. 2010) of the Williams Lifeskills program (WILLIAMS & WILLIAMS 1997; WILLIAMS & WILLIAMS 2006) has been implemented. This intervention was proven to be effective in previous RCT-s conducted with patients suffering from cardiovascular disease in Canada (GIDRON et al. 1999) and Singapore (BISHOP et al. 2005), as well as in distressed adults (KIRBY et al. 2006; WILLIAMS et al. 2009) and adolescents in the US (BARNES et al. 2012) and China (ZHANG et al. 2015). The present study illustrates the implementation and the sustainability of the intervention in a different cultural background and in a real-life but non-workplace setting. To evaluate the effects of the intervention on occupational stress and related symptoms, both organisational and individual psychosocial factors have been measured, providing a more nuanced view of the outcomes.

The present study's main result was that an individually focused intervention – while not being able to influence working conditions as measured by the effort-reward imbalance (ERI) index – was effective in decreasing perceived stress levels and stress-related symptoms, and in increasing well-being indices, along with an improvement in coping skills. We found a highly significant decrease in all stress-related symptoms, with medium effect sizes for psychological symptoms and small effect sizes for subjective somatic complaints. When splitting the sample into high and low work stress subgroups, the data revealed that while both groups benefited from the intervention in terms of several non-symptom oriented indicators (coping skills, life meaning, perceived stress), participants with high work stress reported more robust improvements along symptom-focused indicators such as anxiety, depression, or somatic complaints.

In the subgroup with higher work stress, overcommitment also decreased – supporting the validity of the ERI model, which considers overcommitment as a separate dimension reflecting intrinsic factors of occupational stress such as attitudes towards work and individual motivations. According to the review by VAN VEGCHEL and colleagues (2005), the effects of overcommitment on health outcomes are less clear, and reports on its interaction with ERI are inconsistent. Our results suggest that overcommitment can be a useful indicator of the changes in attitudes, and in the present case, we attribute this change to the applied stress management intervention that includes coping strategies such as saying no and setting priorities. Nevertheless, extrinsic factors such as organisational pressure or job insecurity also have an incontestable influence on overcommitment that are more difficult or impossible to influence through individual-level psychosocial interventions.

An unexpected finding of the present study was the weak but significant increase in ERI score in the low ERI subgroup. This change can be explained either as an effect of the intervention on the awareness and appraisal of the participants regarding their working conditions, or it can reflect the ongoing economic crisis during the study period. These results imply that although those participants who had

manifested stress-related symptoms benefited more, the benefits of the skills training as a preventive measure can also be considered.

Overall, our study illustrates the additive effects of environmental and individual factors on psychosocial outcomes and health risks related to work stress. Therefore, we argue that a work stress measure such as the ERI is useful and has to be included in the evaluation of interventions designed to reduce occupational stress. Although a number of previous international studies have shown that the effort-reward imbalance index is a good predictor of negative health outcomes such as mental health problems or cardiovascular morbidity in diverse working populations (SIEGRIST 2004; STANSFELD & CANDY 2006; KIVIMÄKI et al. 2012), only very few intervention studies considered the ERI model. A study by TSUTSUMI and colleagues (2002) showed that the ERI questionnaire was responsive to organisational changes: either favorable or unfavorable changes at the workplace had a significant impact on the ERI scores. In the present study, there was no beneficial change in the ERI index in accordance with the intervention being individually focused, and thus the working environment remaining unchanged. A comparable intervention study among Japanese workers (MINO et al. 2006) came to similar conclusions: work stress level remained unchanged, despite a decrease in the participants' depression scores. These findings provide further support for the notion that ERI is a reliable measure of organisational stressors, and is not significantly influenced by the respondents' negative appraisal or negative affectivity. On the other hand, this implies that interventions resulting in favorable changes in the working conditions may further improve the outcomes.

The present study is different in several aspects from the majority of occupational stress intervention studies, allowing many important considerations through process evaluation (MURTA et al. 2007). One of these value-added contributions is that the intervention took place outside the worksites with participants being recruited by electronic and printed information leaflets independently of the employer. This design illustrates a real-world implementation that is independent of the attitudes and decisions of workplace management (in Hungary, only a few workplaces offer any stress management programs for their employees). This design has several advantages that might have contributed to the efficacy of the program. Self-selected participants are highly motivated, which is not always the case in workplace interventions organised by the employer. In our sample, employees who participated considered themselves at risk or felt a need to better cope with stress. In accordance with this self-evaluation, the proportion of participants with severe work stress at baseline (defined by ERI index over 1) in our sample was 22.5%, which is significantly higher than the prevalence in Central and Eastern European population surveys: 18.3% in Hungary (SALAVECZ et al. 2006), 13% in the Czech Republic, 6.5% in Russia, 6.5% in Poland (PIKHART et al. 2004). Our results also draw attention to the fact that although an ERI index over 1 is a good indicator of high health risk, employees with ERI values below 1 might also experience significant distress, and interventions might be useful before serious health problems such as cardiovascular diseases develop.

We consider the out-of-worksites setting to be a further advantage that can facilitate perceived anonymity, and thus personal disclosure, when discussing individual work-related stressful situations. In addition, sharing experiences from diverse occupational backgrounds can facilitate the development of coping abilities regarding a larger variety of life situations. In a study published by WILLERT and colleagues (2009), where the intervention was similarly carried out away from the workplace and participants came from a wide range of occupational backgrounds, the authors found that the perceived stress level decreased and capabilities for positive reframing improved; however, the level of work-related stress was not monitored in that study.

On the other hand, self-selection and the out-of-worksites design have their disadvantages, as well. For instance, only a limited number of employees can be reached and often those who seem to be the most in need are less likely to participate due to lack of resources. In a study from the Netherlands (VAN RHENEN 2007) where voluntary participation in an intervention was offered after a stress screening, the refusal rate was significantly higher in employees classified as stressed compared to those not stressed (73% vs. 43%). We speculate that the reasons might be the fear of stigmatisation ('cannot face having problems'), low self-efficacy ('cannot change'), or the perceived lack of time because of the high level of overcommitment. Even in our self-selected sample, the initial work stress level and overcommitment scores were higher in the subgroup that did not complete the intervention, and the most frequent reason given for the drop out (25.8%) was 'too busy to attend' (facilitator's report).

Further, it deserves mentioning that women and white-collar workers were overrepresented in our sample. This is in accordance with the general observation that men are less likely to volunteer for psychological interventions. Behavioral patterns like rumination and compulsive rethinking of stressful situations are more prevalent in women (NOLEN-HOEKSEMA et al. 1999), which can at least partially explain why they are more willing to face their problems using cognitive techniques. In Western, industrialised societies, men are generally less likely to admit to perceived weaknesses and seek professional help, and are also more likely to use non-adaptive, emotion-focused coping strategies such as drinking, smoking, and aggressive behaviors, which supposedly contribute to the extremely high rates of premature mortality in the Hungarian middle-aged male population (KOPP & RÉTHELYI 2004; KOPP et al. 2006). Therefore, further efforts are needed to motivate and involve men in such interventions.

Another issue that frequently occurs in real life voluntary settings is that people with lower educational status are less likely to participate, whereas white-collar workers from the social, health, teaching, and administrative work fields are overrepresented among participants in interventions designed to improve mental health (MURTA et al. 2007). A possible explanation for this is the lack of information and knowledge about stress management programs among blue-collar workers together with lower self-efficacy and the eventual difficulty of understanding cognitive behavioral techniques.

From the sustainability point of view, the quality and reproducibility of an intervention are crucial issues. The definite strength of the intervention employed here lies

in the high quality of its methodology. The multimodal content includes key elements proven to be effective, and the techniques used during the workshops are also evidence-based and standardised. A detailed facilitator manual and a participant workbook assures fidelity to the program at delivery. In our study, data collected from several trained facilitator groups supported the program's reproducibility in various centers by reducing the therapist effect. Some other studies also confirm that the good content and structure of an intervention can guarantee efficacy regardless of the (qualified) person who delivers the program (DE JONG & EMMELKAMP 2000). The intervention groups' relatively large size and the diversity of the occupational background of the participants also support the results' generalisability.

This study's main limitations consist of the lack of a control group and randomisation and the absence of follow-up assessments. However, these features are characteristics of the real-life design where an intervention is implemented without research funds, and where data collection is a voluntary extra effort from both participants and trainers. These limitations have some translational research value, since they provide useful information about the problems encountered when interventions – already shown to produce benefits in rigorous randomised controlled trials – are implemented in real world situations.

## **5. Conclusions**

The present study clearly demonstrates that organisational as well as individual factors play a role in work stress-related symptom formation and negative health outcomes. Although organisational interventions might have a greater impact across a working community, they are rarely implemented. In these cases, individual-focused interventions can still improve resilience and coping abilities even in an unchanged working environment, and this might have 1) curative effects in cases where symptoms are already manifested or 2) preventive effects in cases where people recognise their need for better stress management. Further efforts are needed to increase the involvement of male and lower-educated employees in such programs. Worksite recruitment would be necessary to reach the mass of working people that might be at risk of work-related stress. Offering the training opportunity to all employees independently of their stress level can decrease stigmatisation and serve the improvement and prevention of stress-related problems. Employee assistance programs could include evidence-based trainings organised outside the workplace by so contributing to the employees' better mental and physical health.

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